



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 15 2008

REPLY TO THE ATTENTION OF: DEC 19 2008

AT-18J

Mr. Daniel Murray
Office of Air Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: 2007 PM_{2.5} Exceptional Events

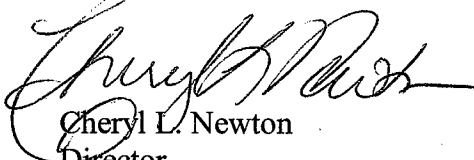
Dear Mr. Murray,

This letter is in response to Indiana Department of Environmental Management (IDEM) June 30, 2008, letter requesting exceptional events concurrence for 2 events which adversely affected PM_{2.5} concentrations measured in Indiana. These two events were the Bugaboo Fire in Southern Georgia / Northern Florida, and July 4, 2008 fireworks.

U. S. Environmental Protection Agency, Region 5 has reviewed IDEM's submitted demonstration package. EPA's Exceptional Events rule on flagged data allows EPA concurrence on data that exceed the standard or contribute to an exceedance of the standard if the state can demonstrate that the event caused the specific concentration at the specific monitoring location. Based on the demonstration provided by IDEM, EPA Region 5 is concurring on 19 of the 150 Bugaboo fire observations and two of the three flagged July 4 observations. We will be placing concurrence and nonconcurrence indicators in the EPA's Air Quality System (AQS) database as detailed in the documentation appended to this letter.

As always, EPA staff are available to answer questions you may have and provide help where needed. If you have any questions, please contact Michael Compher, of the Air Monitoring and Analysis Section, at (312) 886-5745.

Sincerely,


Cheryl L. Newton
Director
Air and Radiation Division

Enclosures

cc: Steve Lengerich
Indiana Department of Environmental Management

Dick Zeiler
Indiana Department of Environmental Management

**PM_{2.5} Exceptional Events Technical Support
Document**

**U.S. Environmental Protection Agency
Region 5**

2007

INTRODUCTION

This document provides the EPA Region 5 rationale for concurrence or non-concurrence with exceptional event flags on the 24-hr average PM_{2.5} concentration recorded during calendar year 2007 at ambient air monitoring sites operated by the Indiana Department of Environmental Management (IDEM). According to 40 CFR 50.1(j), Exceptional event means an event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by the Administrator in accordance with 40 CFR 50.14 to be an exceptional event. It does not include stagnation of air masses or meteorological inversions, a meteorological event involving high temperatures or lack of precipitation, or air pollution relating to source noncompliance. EPA will exclude data from use in determinations of exceedances and National Ambient Air Quality Standard (NAAQS) violations where IDEM demonstrates to EPA's satisfaction that an exceptional event caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the remaining requirements of the Exceptional Events Rule.

40 CFR 50.14(c)(3)(III) states that the demonstration to justify data exclusion shall provide evidence that: (A) The event satisfies the criteria set forth in 40 CFR 50.1(j); (B) There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area; (C) The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and (D) There would have been no exceedance or violation but for the event.

In addition to assembling and submitting the demonstration, the state must provide documentation that public comment process was followed and the state must submit the public comments it received along with its demonstration to EPA. IDEM provided Region 5 with a link to the website containing the exceptional event description, documentation, and instructions for providing comment. IDEM received no comments during the 30-day public comment period held for the 2007 PM_{2.5} exceptional event flags.

EPA Region 5 has reviewed the exceptional event demonstration package submitted by IDEM on June 30th, 2008 and documented the review of each claim. The documentation follows the criteria set forth in the Exceptional Events Rule.

Northern Florida and Southern Georgia Wildfires

Indiana Department of Environmental Management (IDEM) submitted a demonstration and letter requesting concurrence to EPA Region 5 on June 30, 2008 for Exceptional Event claims due to wildfires in Northern Florida and Southern Georgia (a.k.a Bugaboo Scrub Fire). This request contained flags on 150 PM_{2.5} observations which were observed throughout the state of Indiana over an eleven day period from May 23 through June 2, 2007. The following review is organized into two sections. The first section discusses the methodology used to evaluate several of the criteria set forth in the Exceptional Events Rule. Review of criteria A, B and C are addressed as a whole for the entire event in the methodology section; however, a few exceptions are specifically noted in the second section, which contains specific information addressing the review of the flagged observations for each day.

Event Description and Causal Connection Between the Event and Air Quality

IDEM's demonstration states, "During the period of May 23 – June 2, 2007, smoke from Bugaboo Scrub wildfire in northern Florida and southern Georgia impacted the State of Indiana by causing several exceedances of the 24-hour PM_{2.5} NAAQS and significantly elevating PM_{2.5} levels as a whole for the majority of the State." IDEM also included (Appendix 1) several maps and news articles depicting and describing the fires in Northern Florida and Southern Georgia which occurred in May and June 2007. Due to the vast acreage consumed by the wildfires, the general and widespread impacts that were observed between the location of the fires and the impacted monitoring locations in Indiana, IDEM sufficiently established a causal relationship between the measured concentrations and the Bugaboo fire during the May 23 to June 2 period.

METHODOLOGY

Assessing Whether the Flagged Observation was in Excess of the "Normal" Values Calculation

To meet the exceptional event criteria, the observation must be in excess of the normal, historical values. A useful measure of the "normal" concentration is the 84th percentile (mean + 1 standard deviation) at each monitoring site. The 84th percentile is considered to represent the range of normally expected high values at that site due to normal local and background sources. To account for seasonal differences in PM_{2.5} concentrations, a two-month window of data in each of the preceding three calendar years was selected to determine "normal" concentrations. For the Bugaboo Scrub fire event claims, 24-hr PM_{2.5} federal reference method data was selected for May and June in 2004, 2005, and 2006. An observation is considered to deviate from normal if its value is substantially higher than the upper 84th percentile of the multi-year measurements for the same site in the prior three years. Comparing the site specific upper 84th percentiles to the flagged observations, all of IDEM's flagged observations are in excess of the normal, historical values.

The following table provides the 84th percentiles for each of IDEM's monitoring sites using the methodology described above.

Site ID	Site Name	County	84 th Percentile ($\mu\text{g}/\text{m}^3$)
18-089-0006	East Chicago	Lake	21.1
18-089-0022	Iitri	Lake	21.1
18-089-0026	Burr Street	Lake	24.6
18-089-0027	Griffith	Lake	20.1
18-089-0031	Madison Street	Lake	20.6 *
18-089-1003	Ivanhoe School	Lake	21.1
18-089-2004	Purdue	Lake	21.3
18-089-2010	Clark High School	Lake	21.3
18-091-0011	Marsh School	LaPorte	19.4
18-091-0012	Lake Street	LaPorte	19.2
18-127-0020	Dunes Nat'l Lakeshore	Porter	19.5
18-127-0024	Ogden Dunes	Porter	20.5
18-039-0003	Pierre Moran School	Elkhart	19.1
18-141-0014	Nuner School	St. Joseph	18.3
18-141-0015	Shields Drive	St. Joseph	20.2 *
18-141-2004	LaSalle High School	St. Joseph	18.5
18-003-0004	Beacon Street	Allen	18.5
18-003-0014	Taylor University	Allen	18.5
18-035-0006	Central High School	Delaware	19.6
18-065-0003	Mechanicsburg	Henry	19.8
18-067-0003	Kokomo	Madison	19.7
18-095-0009	West 5 th Street	Madison	20.9
18-097-0042	Mann Road	Marion	20.9
18-097-0043	West Street	Marion	23.5
18-097-0066	English Avenue	Marion	24.7
18-097-0078	Washington Park	Marion	21.9
18-097-0079	East 75 th Street	Marion	21.0
18-097-0081	West 18 th Street	Marion	22.9
18-097-0083	East Michigan Street	Marion	21.7
18-157-0008	Greenbush Street	Tippecanoe	20.4
18-167-0018	Lafayette Avenue	Vigo	21.1
18-167-0023	Devaney School	Vigo	20.8
18-037-0004	Jasper-Sport	Dubois	19.3 *
18-034-0005	Jasper Golf	Dubois	19.7 *
18-037-2001	Jasper Post Office	Dubois	24.1
18-083-0004	Southwest Ag	Knox	22.0
18-147-0009	Dale	Spencer	18.8
18-163-0006	Civic Center	Vanderburgh	22.2
18-163-0012	Mill Road	Vanderburgh	22.6
18-163-0016	Univ. of Evansville	Vanderburgh	21.8
18-019-0006	Walnut Street	Clark	24.4
18-043-1004	New Albany	Floyd	23.4

* These sites do not have a full data record from May and June 2004 to 2006

Demonstration of No Exceedance “But For” the Event

In evaluating the “but for” criteria (40 CFR 50.14(c)(3)(III)(D), there would have been no exceedance or violation but for the event), each flagged event fell into one of three categories, (A) the observation exceeded the level of the daily NAAQS ($35 \mu\text{g}/\text{m}^3$), (B) the observation did not exceed the level of the daily NAAQS but contributed to a violation of the daily NAAQS (i.e. a value at or above the annual 98th percentile for monitoring site that has a three year design value violating the daily NAAQS), or (C) the observation exceeded the level of the annual NAAQS ($15 \mu\text{g}/\text{m}^3$). In order to meet the “but for” criteria, observations needed to pass the “but for” test relative to either the specific NAAQS level that was exceeded (categories A and C), or the level at which the observation would no longer contribute to a violation of the daily NAAQS (category B).

This paragraph describes a hypothetical example of an observation in category B, described above. In 2007, a monitoring site with a three year design value (see below for annual 98th percentiles contributing to the design value) of $36 \mu\text{g}/\text{m}^3$ observed a concentration of $34.5 \mu\text{g}/\text{m}^3$, and this observation is appropriately flagged and documented in the EPA air quality database. Because $34.5 \mu\text{g}/\text{m}^3$ is not a violation of the daily standard, it is not in category A described above. However, since this monitoring site violates the NAAQS with a three year design value of $36 \mu\text{g}/\text{m}^3$, and the flagged $34.5 \mu\text{g}/\text{m}^3$ observation is above the 2007 annual 98th percentile ($34 \mu\text{g}/\text{m}^3$), it contributes to the violation and thus falls into category B. The “but for” criteria for events in category B is met if the state demonstrates that there would have been no exceedance or violation (emphasis added) but for the event (i.e. at least below $34 \mu\text{g}/\text{m}^3$). The “but for” criteria for events in categories A and B are met if the demonstrates that the event contributed enough mass to cause the exceedance of the respective NAAQS level.

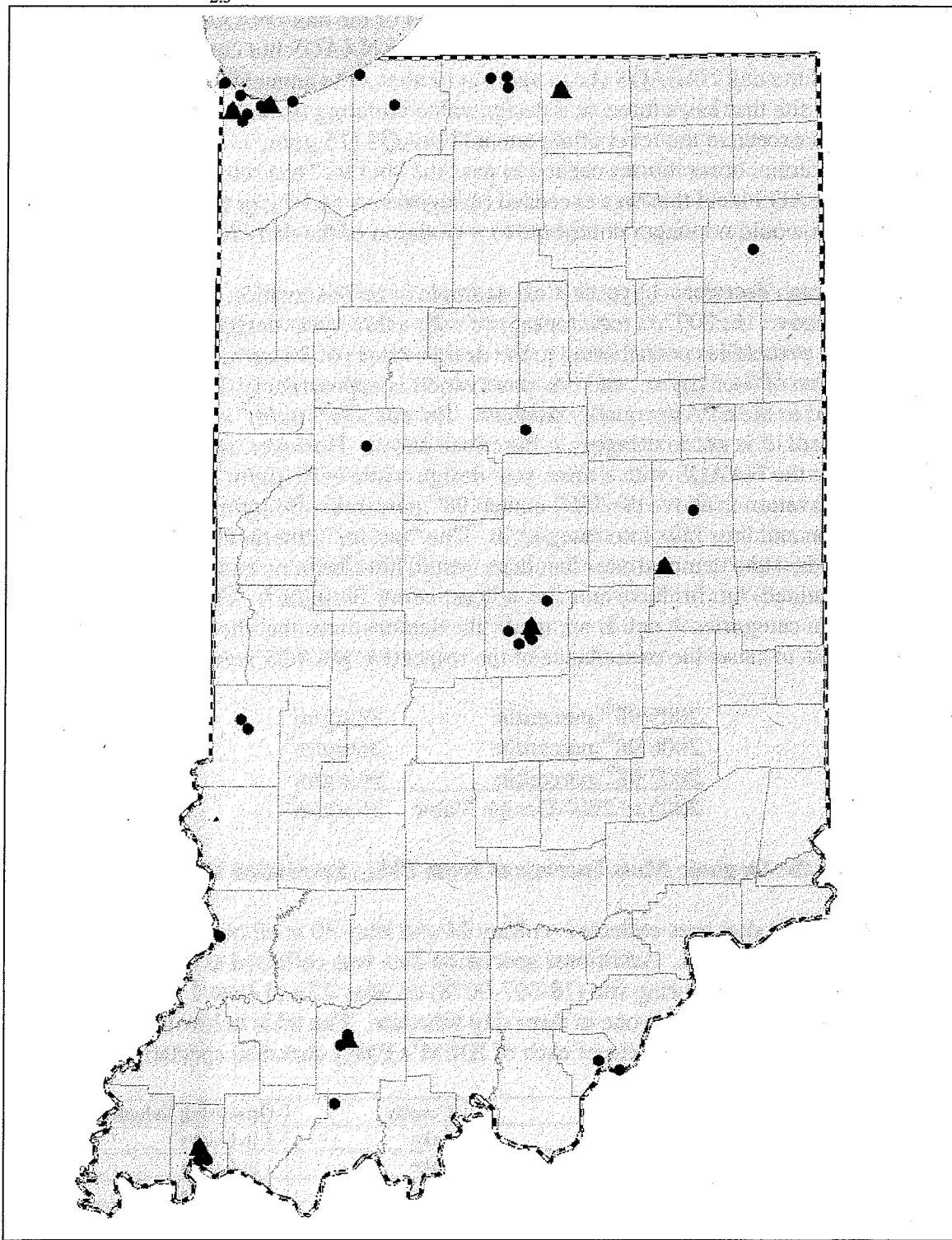
2005 98 th percentile	$38 \mu\text{g}/\text{m}^3$
2006 98 th percentile	$36 \mu\text{g}/\text{m}^3$
2007 98 th percentile	$34 \mu\text{g}/\text{m}^3$
2005 to 2007 Design Value	$36 \mu\text{g}/\text{m}^3$

Estimating the Organic Mass Increment from PM_{2.5} Speciation Data

PM_{2.5} speciation data was collected on May 24 and May 30 at all of IDEM’s PM_{2.5} chemical speciation sites. Additional speciation data was collected at the Indianapolis Washington Park monitoring site (18-097-0078) on May 27 and June 2 because this site operates on a more frequent one in three day schedule. The table below identifies the location and operating schedule of each of IDEM’s PM_{2.5} chemical speciation monitors.

Site ID	Site Name	County	Operating Schedule
18-089-0022	Gary Iitri	Lake	1 in 6 days
18-089-0004	Hammond – Purdue	Lake	1 in 6 days
18-039-0003	Pierre Moran School	Elkhart	1 in 6 days
18-065-0003	Mechanicsburg	Henry	1 in 6 days
18-097-0078	Washington Park	Marion	1 in 3 days
18-037-0001	Jasper Post Office	Dubois	1 in 6 days
18-163-0006	Evansville Civic Center	Vanderburgh	1 in 6 days

The map below depicts the locations of the PM_{2.5} speciation monitoring sites (red triangles) and the PM_{2.5} mass monitoring sites (green circles). Each PM_{2.5} speciation site also contains a PM_{2.5} mass monitor.



Excess carbon is one of several indicators of contribution from biomass burning. Estimating the approximate increment above historical levels provides evidence that can be used to support the demonstration of the “but for” criteria. The following formula is used to approximate the organic mass increment.

$$OM_{inc} = 2 * (OM_{obs} - OM_{hist}), \text{ where}$$

OM_{inc} is the approximate organic mass increment

OM_{obs} is the organic mass observed at the nearest speciation monitor

OM_{hist} is the organic mass historical average (OM_{hist}) and is derived from all site specific $PM_{2.5}$ speciation observations collected by Indiana’s chemical speciation network in May and June during the previous two years.

The factor of 2 (Turpin and Lim, 2001) is an estimate of the average organic molecular weight per carbon weight for the organic aerosol.

Turpin, B.J., Lim, H.J., 2001. Species Contributions to $PM_{2.5}$ Mass Concentrations: Revisiting common Assumptions for Estimating Organic Mass; Aerosol Science and Technology. Volume 35, Pages 602-610.

In addition to approximating the organic mass increment using the historical average (OM_{hist}), 68% and 95% probabilities were calculated using the historical average ± 1 and 2 standard deviations, respectively. Calculating the probability accounts for the variability of organic mass observed at these monitoring locations over the historical period being used and thus provides additional confidence regarding the level of contribution from the event. The following table displays the site- and day-specific approximate organic mass increment, as well as estimates of the upper and lower range of 68 and 95% probabilities.

Site ID	May 24			May 27			May 30		
	OM_{inc}	68%	95%	OM_{inc}	68%	95%	OM_{inc}	68%	95%
18-037-2001	5.9	2.8, 9.1	-0.4, 12.2				13.5	10.3, 16.6	7.2, 19.7
18-039-0003	6.5	3.6, 9.5	0.6, 12.5				7.8	4.8, 10.8	1.9, 13.8
18-065-0003	7.4	4.6, 10.1	1.9, 12.9				7.9	5.1, 10.7	2.4, 13.4
18-089-0022	9.0	3.3, 14.6	-2.3, 20.2				6.6	1.0, 12.2	-4.6, 17.9
18-089-2004	11.3	8.0, 14.6	4.6, 18.0				7.7	4.4, 11.1	1.0, 14.4
18-097-0078	7.0	3.5, 10.5	0.0, 13.9	7.1	3.5, 10.5	0.0, 13.9	8.6	5.1, 12.1	1.6, 15.6
18-163-0012	8.1	5.4, 10.8	2.7, 13.5				6.8	4.1, 9.5	1.4, 12.2

Event Date: May 23, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-091-0011	Michigan City	LaPorte	31.7	No
18-039-0003	Pierre Moran School	Elkhart	32.8	No
18-141-0014	Nuner School	St. Joseph	33.9	No
18-003-0004	Beacon Street	Allen	43.4	No
18-035-0006	Central H.S.	Delaware	36.0	Yes
18-095-0009	West 5 th Street	Madison	36.4	Yes
18-097-0066	English Avenue	Marion	37.9	Yes
18-097-0078	Washington Park	Marion	38.5	Yes
18-157-0008	Greenbush Street	Tippecanoe	34.7	Yes
18-167-0023	Devaney School	Vigo	32.6	No
18-037-2001	Jasper Post Office	Dubois	28.4	No

Causal Connection: IDEM established a causal connection between the event and air quality for all but one of the flagged observations on May 23 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses. However, IDEM did not provide sufficient evidence in the demonstration to explain why the Beacon Street site (18-003-0004) in Ft. Wayne had a substantially higher concentration (approximately $5 \mu\text{g}/\text{m}^3$) than any of the other observations collected throughout the state on May 23. Particulate matter emitted from a fire located several hundred miles away from monitoring sites relatively close to one another (as compared to the distance to the event) should have relatively uniform impact from the event, provided that there are no major differences due to meteorological factors between the monitoring sites. Therefore, Region 5 concurrence cannot be provided for the Ft. Wayne flagged observation.

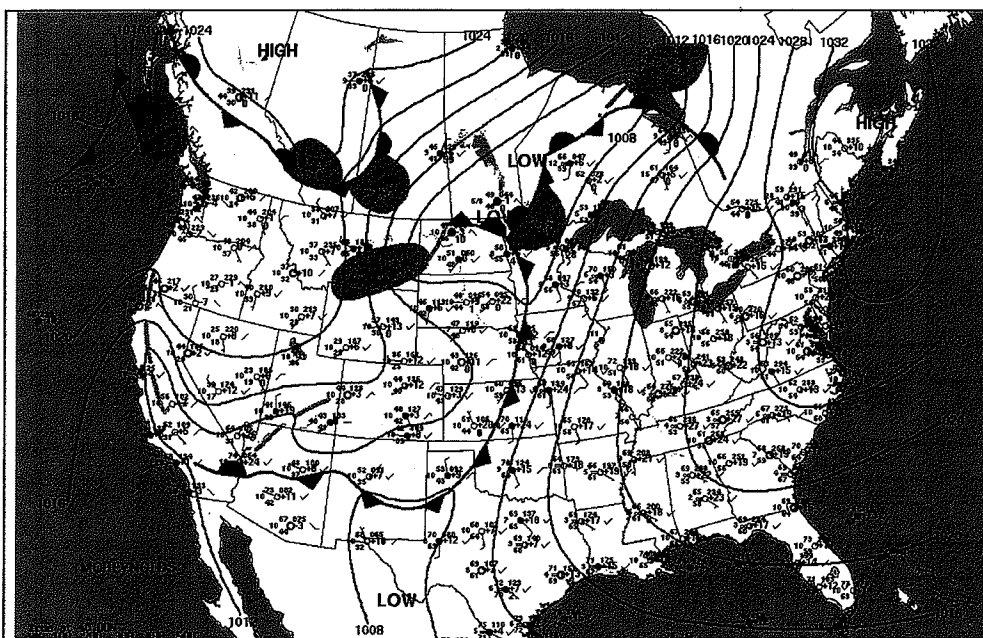


Figure 1: NOAA Daily Weather Map; May 23, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: No chemical speciation data was collected on May 23, but Region 5 concluded that using speciation data from May 24 is acceptable based on a review finding no major changes between the meteorology on May 23 and May 24, as well as additional similarities from estimates of sulfate and smoke based on the Naval Research Laboratory NAAPS global dust model.

Using speciation data from May 24, the approximate organic carbon increment ranges from 5.9 to 11.3 $\mu\text{g}/\text{m}^3$. Given this range of approximate organic mass increments, the 4 observations which exceeded the 35 $\mu\text{g}/\text{m}^3$ NAAQS level meet the "but for" criteria; because, had there been no event, the concentrations would not have exceeded the 24-hr NAAQS. The 34.7 $\mu\text{g}/\text{m}^3$ observed at site 18-157-0008 (Greenbush Street) contributes to a violation because the 2005 to 2007 daily design value for that site is above the daily NAAQS and the 2007 annual 98th percentile contributing to the violation at that site is 34.2 $\mu\text{g}/\text{m}^3$. Since the organic mass increment is estimated as several micrograms per cubic meter, then this observation also satisfies the "but for" test. Additionally, using the lower incremental estimates calculated as the historical mean plus 1 standard deviation (68% probability), the more conservative approximate increment for the nearest speciation site also satisfies the "but for" criteria.

Because the remaining 5 observations (ranging from 28.4 to 33.9 $\mu\text{g}/\text{m}^3$) do not exceed or contribute to violations of the 24-hour NAAQS, the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS (15 $\mu\text{g}/\text{m}^3$). . None of these 5 observations meet the "but for" criteria relative to the annual NAAQS and thus Region 5 does not concur on the exceptional event flags.

Event Date: May 24, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-089-0006	East Chicago	Lake	29.5	No
18-089-0022	Iitri	Lake	28.4	No
18-089-0026	Burr Street	Lake	31.2	No
18-089-0027	Griffith	Lake	27.6	No
18-089-0031	Madison Street	Lake	27.6	No
18-089-1003	Ivanhoe School	Lake	30.4	No
18-089-2004	Purdue	Lake	30.1	No
18-089-2010	Clark High School	Lake	29.3 *	No
18-091-0011	Marsh School	LaPorte	27.9	No
18-091-0012	Lake Street	LaPorte	27.0	No
18-127-0020	Dunes Nat'l Lakeshore	Porter	25.8	No
18-127-0024	Ogden Dunes	Porter	27.9	No
18-039-0003	Pierre Moran School	Elkhart	30.9	No
18-141-0014	Nuner School	St. Joseph	31.7	No
18-141-0015	Shields Drive	St. Joseph	28.6	No
18-141-2004	LaSalle High School	St. Joseph	28.7	No
18-003-0004	Beacon Street	Allen	34.9	No
18-003-0014	Taylor University	Allen	31.0	No
18-035-0006	Central High School	Delaware	31.4	No
18-065-0003	Mechanicsburg	Henry	30.7	No
18-067-0003	Kokomo	Madison	30.6	No
18-095-0009	West 5 th Street	Madison	29.4	No
18-097-0042	Mann Road	Marion	30.7	No
18-097-0043	West Street	Marion	31.6	No
18-097-0066	English Avenue	Marion	33.1	No
18-097-0078	Washington Park	Marion	31.9	No
18-097-0079	East 75 th Street	Marion	30.5	No
18-097-0081	West 18 th Street	Marion	IN	
18-097-0083	East Michigan Street	Marion	30.2	No
18-157-0008	Greenbush Street	Tippecanoe	27.8	No
18-167-0018	Lafayette Avenue	Vigo	28.8	No
18-167-0023	Devaney School	Vigo	27.7	No
18-037-0004	Jasper Sport	Dubois	25.7	No
18-034-0005	Jasper Golf	Dubois	26.5	No
18-037-2001	Jasper Post Office	Dubois	25.0	No
18-083-0004	Southwest Ag	Knox	28.4	No
18-147-0009	Dale	Spencer	25.5	No
18-163-0006	Civic Center	Vanderburgh	IN	
18-163-0012	Mill Rd.	Vanderburgh	23.9	No
18-163-0016	Univ. of Evansville	Vanderburgh	25.8	No
18-019-0006	Walnut Street	Clark	32.0	No
18-043-1004	New Albany	Floyd	29.7	No

* the concentration reported in the demonstration on 5/24 at the Clark High School site was $39.3 \mu\text{g}/\text{m}^3$, however the concentration reported by IDEM in EPA's Air Quality (AQS) database is $29.3 \mu\text{g}/\text{m}^3$.

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 24 with the Appendix 1 accounts and

maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

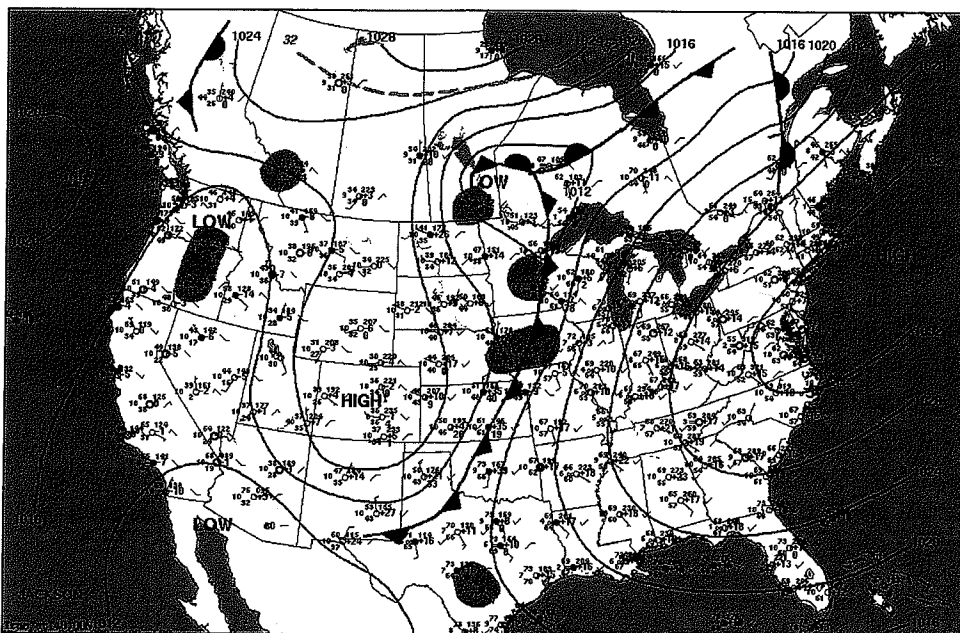


Figure 2: NOAA Daily Weather Map; May 24, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: None of the observations on May 24 (ranging from 23.9 to 33.1 $\mu\text{g}/\text{m}^3$) exceed or contribute to violations of the 24-hour NAAQS, so the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS (15 $\mu\text{g}/\text{m}^3$). Chemical speciation data was collected on May 24, and the approximate organic carbon increment ranges from 5.9 to 11.3 $\mu\text{g}/\text{m}^3$. The highest (9.0 and 11.3) of these approximate organic carbon increments are from the speciation monitors located in Lake County. The $\text{PM}_{2.5}$ mass from monitors in this area, however, is more than 9 $\mu\text{g}/\text{m}^3$ above the annual NAAQS. The lowest flagged value (23.9 $\mu\text{g}/\text{m}^3$) on May 24 was in Vanderburgh County, where the approximate organic carbon increment was 8.1. Given this range of approximate organic mass increments and the spatial distribution of those estimates with respect to the flagged $\text{PM}_{2.5}$ mass observations, none of the observations meet the "but for" criteria. Without the impact from the fire, the observations would have exceeded the annual NAAQS and therefore Region 5 does not concur on any of the exceptional event flags for May 24.

Event Date: May 25, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-035-0006	Central High School	Delaware	30.7	No
18-095-0009	West 5 th Street	Madison	30.2	No
18-097-0066	English Avenue	Marion	35.8	Yes
18-097-0078	Washington Park	Marion	34.9	No
18-167-0023	Devaney School	Vigo	30.4	No
18-037-2001	Jasper Post Office	Dubois	25.9	No
18-019-0006	Walnut Street	Clark	32.8	No

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 25 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses. As seen on the surface weather map below, a front pushed through NW Indiana, keeping the area of impact limited to central and southern Indiana.

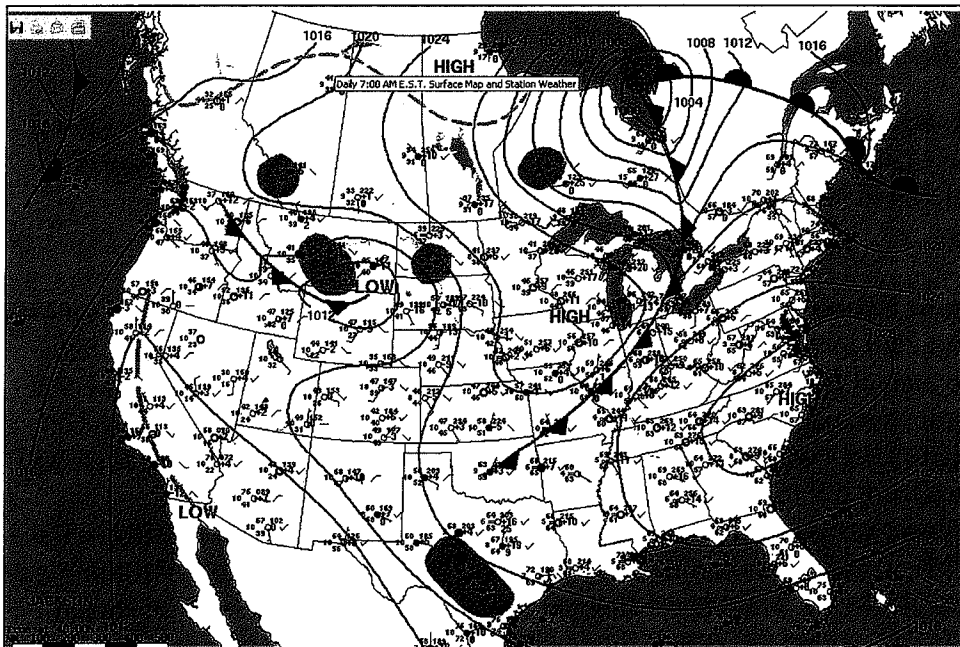


Figure 3: NOAA Daily Weather Map; May 25, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: No chemical speciation data was collected on May 25, but EPA has determined that using speciation data from May 24 is acceptable based on a review of the finding no major changes between the meteorology

on May 24 and May 25 at the flagged monitoring locations, as well as additional similarities from estimates of sulfate and smoke based on the Naval Research Laboratory NAAPS global dust model.

Only one of the flagged observations on May 25 exceeded the 24-hr NAAQS of $35 \mu\text{g}/\text{m}^3$. Using speciation data from May 24, the approximate organic carbon increment range from the nearest speciation monitor is $7.0 \mu\text{g}/\text{m}^3$. Subtracting this estimate from the observed value ($35.8 \mu\text{g}/\text{m}^3$) results in an adjusted concentration below the 24-hr NAAQS. Therefore, the observation from Indianapolis' English Avenue site (18-097-0066) satisfies the "but for" criteria.

Because the remaining flagged observations (ranging from 25.9 to $34.9 \mu\text{g}/\text{m}^3$) do not exceed or contribute to violations of the 24-hour NAAQS, the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$). . None of these 5 observations meet the "but for" criteria relative to the annual NAAQS and thus Region 5 does not concur on the exceptional event flags.

Event Date: May 26, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-095-0009	West 5 th Street	Madison	27.8	No
18-097-0066	English Avenue	Marion	31.3	No
18-097-0078	Washington Park	Marion	29.3	No
18-037-2001	Jasper Post Office	Dubois	41.5	No
18-019-0006	Walnut Street	Clark	32.6	No

Causal Connection: IDEM established a causal connection between the event and air quality for all but one of the flagged observations on May 26th with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses. However, IDEM did not provide sufficient evidence in the demonstration to explain why the Jasper Post Office site (18-037-2001) in Dubois County had a substantially higher concentration (approximately $9 \mu\text{g}/\text{m}^3$) than any of the other observations collected throughout the state on May 26. Particulate matter emitted from a fire located several hundred miles away from monitoring sites relatively close to one another (as compared to the distance to the event) should have relatively uniform impact from the event, provided that there are no major differences due to meteorological factors between the monitoring sites. Therefore, Region 5 concurrence cannot be provided for the Dubois County flagged observation.

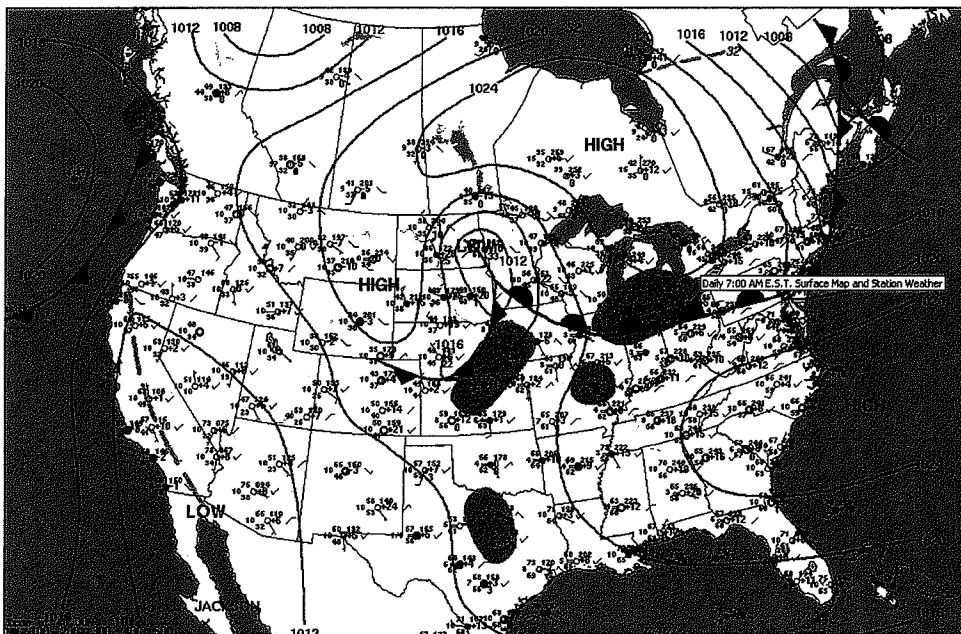


Figure 4: NOAA Daily Weather Map; May 26, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance “But For” the Event: Aside from the Dubois County observation addressed above, none of the observations on May 26 (ranging from 27.8 to 32.6 $\mu\text{g}/\text{m}^3$) exceed or contribute to violations of the 24-hour NAAQS, so the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS (15 $\mu\text{g}/\text{m}^3$). Chemical speciation data was collected on May 27 at the $\text{PM}_{2.5}$ speciation trends site in Indianapolis and the approximate organic carbon increment is 7.1 $\mu\text{g}/\text{m}^3$. Given this increment, none of the observations meet the “but for” criteria. Had there been no event, the concentrations would have exceeded the annual NAAQS; therefore, Region 5 does not concur on any of the remaining exceptional event flags for May 26.

Event Date: May 27, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-095-0009	West 5 th Street	Madison	24.5	No
18-097-0042	Mann Road	Marion	23.0	No
18-097-0043	West Street	Marion	25.1	No
18-097-0066	English Avenue	Marion	26.6	No
18-097-0078	Washington Park	Marion	24.5	No
18-097-0079	East 75 th Street	Marion	25.2	No
18-097-0081	West 18 th Street	Marion	25.4	No
18-097-0083	East Michigan Street	Marion	25.3	No
18-037-0004	Jasper Sport	Dubois	30.0	No
18-034-0005	Jasper Golf	Dubois	30.0	No
18-037-2001	Jasper Post Office	Dubois	30.5	No
18-083-0004	Southwest Ag	Knox	29.5	No
18-147-0009	Dale	Spencer	30.5	No
18-163-0006	Civic Center	Vanderburgh	IN	
18-163-0012	Mill Rd.	Vanderburgh	29.9	No
18-163-0016	Univ. of Evansville	Vanderburgh	27.7	No
18-019-0006	Walnut Street	Clark	28.9	No
18-043-1004	New Albany	Floyd	25.4	No

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 27 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

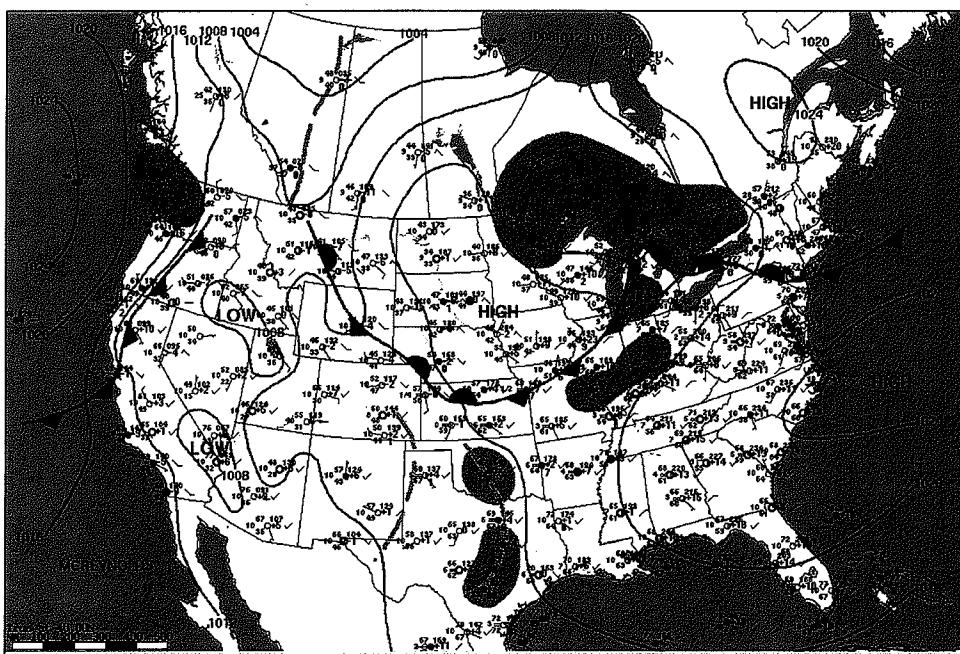


Figure 5: NOAA Daily Weather Map; May 27, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: None of the observations on May 27 (ranging from 23.0 to 30.5 $\mu\text{g}/\text{m}^3$) exceed or contribute to violations of the 24-hour NAAQS, so the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS (15 $\mu\text{g}/\text{m}^3$). Chemical speciation data was collected on May 27th at the PM_{2.5} speciation trends site in Indianapolis and the approximate organic carbon increment is 7.1 $\mu\text{g}/\text{m}^3$. Given this increment, none of the observations meet the "but for" criteria. Had there been no event, the concentrations would have exceeded the annual NAAQS; therefore, Region 5 does not concur on any of the exceptional event flags for May 27.

Event Date: May 28, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-095-0009	West 5 th Street	Madison	22.8	No
18-097-0066	English Avenue	Marion	28.7	No
18-097-0078	Washington Park	Marion	26.3	No
18-037-2001	Jasper Post Office	Dubois	34.2	Yes
18-019-0006	Walnut Street	Clark	33.8	No

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 28 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses. Similar to the previous several days, the northern portion of the state was not impacted due to frontal boundaries impacting and restricting transport of smoke from the Bugaboo fires.

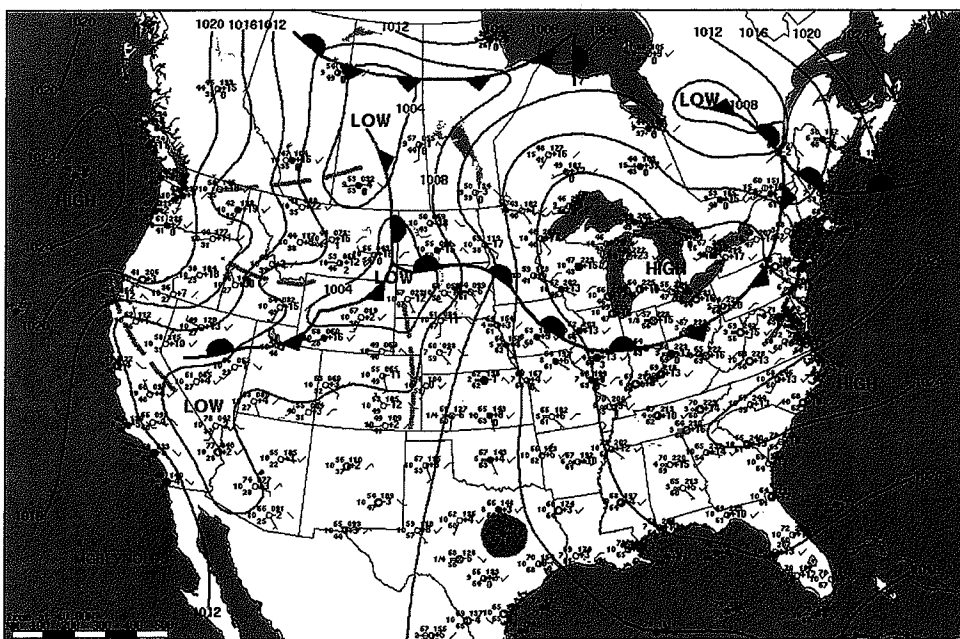


Figure 6: NOAA Daily Weather Map; May 28, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: None of the observations on May 27 (ranging from 22.8 to 34.2 $\mu\text{g}/\text{m}^3$) exceeded the 24-hour NAAQS; however, the Jasper Post Office observation does contribute to a violation of the 24-hr NAAQS. The 34.2 $\mu\text{g}/\text{m}^3$ observed at this site contributes to a violation because the 2005 to 2007 daily design value for that site is above the standard and the 2007 annual 98th percentile at that

site is $34.2 \mu\text{g}/\text{m}^3$. Since this observation is the annual 98th percentile, a contribution of 0.1 or more $\mu\text{g}/\text{m}^3$ from the Bugaboo fire is evidence to satisfy the "but for" test. The causal connection was clearly established, and the highest concentrations observed throughout the period were observed on the following day. Therefore, Region 5 concurs on the exceptional event flag at this site.

For the remaining four flagged observations, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$). Chemical speciation data was collected on May 27 at the PM_{2.5} Speciation trends site in Indianapolis and the approximate organic carbon increment is $7.1 \mu\text{g}/\text{m}^3$. Given this increment, none of the observations meet the "but for" criteria according to the annual NAAQS. Therefore, Region 5 does not concur on any of the remaining exceptional event flags for May 28.

Event Date: May 29, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-091-0011	Michigan City	LaPorte	36.7	Yes
18-039-0003	Pierre Moran School	Elkhart	34.7	Yes
18-141-0014	Nuner School	St. Joseph	37.1	Yes
18-003-0004	Beacon Street	Allen	33.8	No
18-035-0006	Central H.S.	Delaware	35.1	Yes
18-095-0009	West 5 th Street	Madison	38.0	Yes
18-097-0066	English Avenue	Marion	37.9	Yes
18-097-0078	Washington Park	Marion	37.6	Yes
18-157-0008	Greenbush Street	Tippecanoe	36.8	Yes
18-167-0023	Devaney School	Vigo	39.6	Yes
18-037-2001	Jasper Post Office	Dubois	39.5	Yes
18-019-1004	Walnut Street	Clark	38.2	Yes

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 29th with the Appendix 1 accounts and maps of the Bugaboo fires in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

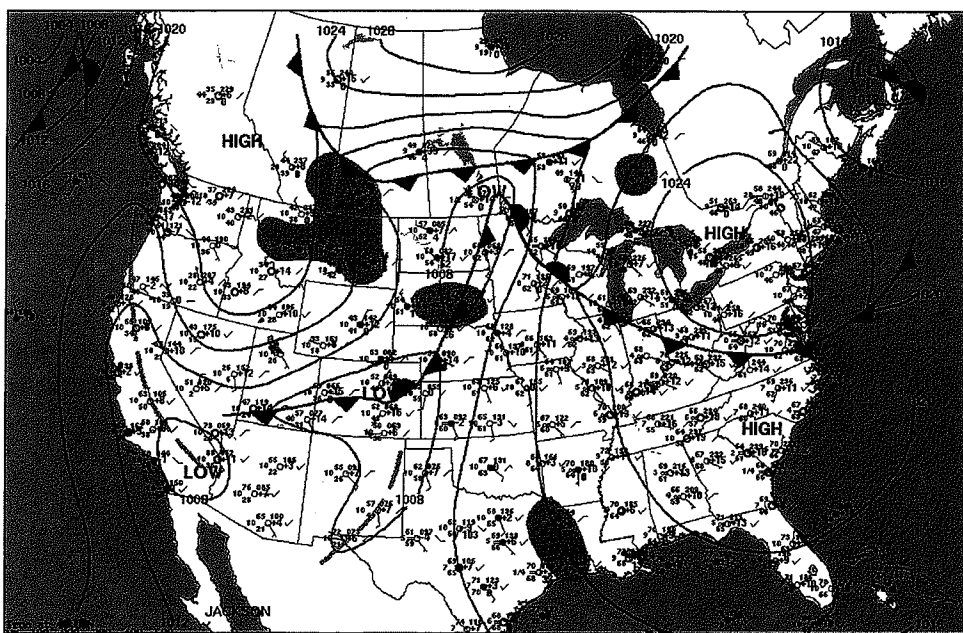


Figure 7: NOAA Daily Weather Map, May 29, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance “But For” the Event: The highest concentrations observed during the multi-day period impacted by the Bugaboo fires were on May 29. All but two of the flagged observations exceeded the 24-hour NAAQS, the highest being $39.6 \mu\text{g}/\text{m}^3$ observed at Devaney School (18-167-0023) in Vigo County in West Central Indiana.

Using speciation data from May 30, the day after these elevated concentrations were observed, the approximate organic carbon increment ranges from 6.6 in northern Indiana to $13.5 \mu\text{g}/\text{m}^3$ in southern Indiana. After subtracting the approximate organic carbon increments from the nearest speciation monitor, the exceedances of the daily NAAQS would not have occurred “but for” the event. Furthermore, using the more conservative incremental estimates calculated as the historical mean plus 2 standard deviations (95% probability), the more conservative approximate increment still satisfies the “but for” criteria. Therefore, Region 5 concurs on these events.

The flagged observation (34.7) at Pierre Moran School in Ft. Wayne does not exceed the 24-hr NAAQS, but does contribute to a violation because the 2005 to 2007 daily design value for that site is above the standard and the 2007 annual 98th percentile at that site is $34.6 \mu\text{g}/\text{m}^3$. Since the organic mass increment is estimated as several micrograms per cubic meter at the nearest speciation site, then this observation also satisfies the “but for” criteria relative to the level of the 98th percentile. Region 5 concurs on this flagged observation.

The remaining flagged observation (33.8 at Beacon Street) did not exceed the 24-hr NAAQS and does not contribute to a violation, so the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$). The approximate organic carbon increments from the speciation network do not provide enough mass to conclude that the exceedance of the annual NAAQS would not have occurred but for the event. Therefore, Region 5 does not concur on the exceptional event flag at this site.

Event Date: May 30, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-089-0006	East Chicago	Lake	32.5	No
18-089-0022	Iitri	Lake	31.9	No
18-089-0026	Burr Street	Lake	36.8	Yes
18-089-0027	Griffith	Lake	IN	No
18-089-0031	Madison Street	Lake	IN	No
18-089-1003	Ivanhoe School	Lake	33.1	No
18-089-2004	Purdue	Lake	32.4	No
18-089-2010	Clark High School	Lake	32.2	No
18-091-0011	Marsh School	LaPorte	31.5	No
18-091-0012	Lake Street	LaPorte	31.0	No
18-127-0020	Dunes Nat'l Lakeshore	Porter	30.1	No
18-127-0024	Ogden Dunes	Porter	31.5	No
18-039-0003	Pierre Moran School	Elkhart	32.8	No
18-141-0014	Nuner School	St. Joseph	34.0	No
18-141-0015	Shields Drive	St. Joseph	30.8	No
18-141-2004	LaSalle High School	St. Joseph	31.3	No
18-003-0004	Beacon Street	Allen	33.7	No
18-003-0014	Taylor University	Allen	33.1	No
18-035-0006	Central High School	Delaware	33.4	No
18-065-0003	Mechanicsburg	Henry	32.4	No
18-067-0003	Kokomo	Madison	33.5	No
18-095-0009	West 5 th Street	Madison	32.9	No
18-097-0042	Mann Road	Marion	31.0	No
18-097-0043	West Street	Marion	33.2	No
18-097-0066	English Avenue	Marion	34.1	No
18-097-0078	Washington Park	Marion	34.1	No
18-097-0079	East 75 th Street	Marion	32.4	No
18-097-0081	West 18 th Street	Marion	31.4	No
18-097-0083	East Michigan Street	Marion	32.9	No
18-157-0008	Greenbush Street	Tippecanoe	32.7	No
18-167-0018	Lafayette Avenue	Vigo	29.2	No
18-167-0023	Devaney School	Vigo	29.6	No
18-037-0004	Jasper Sport	Dubois	IN	No
18-034-0005	Jasper Golf	Dubois	33.1	No
18-037-2001	Jasper Post Office	Dubois	31.8	No
18-083-0004	Southwest Ag	Knox	29.1	No
18-147-0009	Dale	Spencer	31.2	No
18-163-0006	Civic Center	Vanderburgh	26.5	No
18-163-0012	Mill Rd.	Vanderburgh	28.0	No
18-163-0016	Univ. of Evansville	Vanderburgh	27.6	No
18-019-0006	Walnut Street	Clark	29.2	No
18-043-1004	New Albany	Floyd	28.4	No

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 31 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air

trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

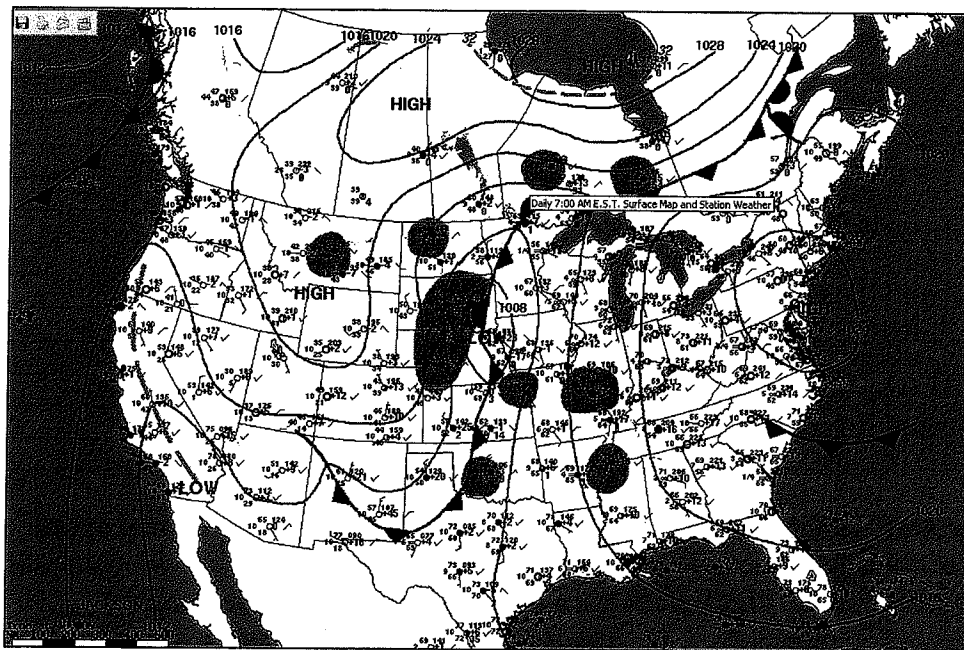


Figure 8: NOAA Daily Weather Map; May 30, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: Only one of the observations on May 30 exceeds or contributes to a violation of the 24-hour NAAQS. The $36.8 \mu\text{g}/\text{m}^3$ observed at the Burr Street monitor (18-089-0026) in Lake County meets the "but for" criteria based on incremental impact ($6.6 \mu\text{g}/\text{m}^3$) approximated from the nearby Gary Iitri $\text{PM}_{2.5}$ speciation data.

The remaining flagged observations (ranging from 26.5 to $34.1 \mu\text{g}/\text{m}^3$) did not contribute to a violation of the 24-hr NAAQS and do not contribute to a violation, so the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$). The approximate organic carbon increment ranges from 6.6 to $8.6 \mu\text{g}/\text{m}^3$, except for the Dubois site, which is approximated at $13.5 \mu\text{g}/\text{m}^3$. Taken this range of approximate organic mass increments and applied to the observed flagged concentrations, none of the remaining observations meet the "but for" criteria. For May 30, Region 5 concurs only on the $36.8 \mu\text{g}/\text{m}^3$ observed at the Burr Street monitor (18-089-0026) in Lake County.

Event Date: May 31st, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-091-0011	Michigan City	LaPorte	30.2	No
18-039-0003	Pierre Moran School	Elkhart	31.3	No
18-141-0014	Nuner School	St. Joseph	32.0	No
18-003-0004	Beacon Street	Allen	33.0	No
18-035-0006	Central H.S.	Delaware	30.2	No
18-095-0009	West 5 th Street	Madison	32.6	No
18-097-0066	English Avenue	Marion	34.6	No
18-097-0078	Washington Park	Marion	32.0	No
18-157-0008	Greenbush Street	Tippecanoe	30	No
18-167-0023	Devaney School	Vigo	30.5	No
18-037-2001	Jasper Post Office	Dubois	IN	
18-019-1004	Walnut Street	Clark	33.4	No

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on May 31st with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

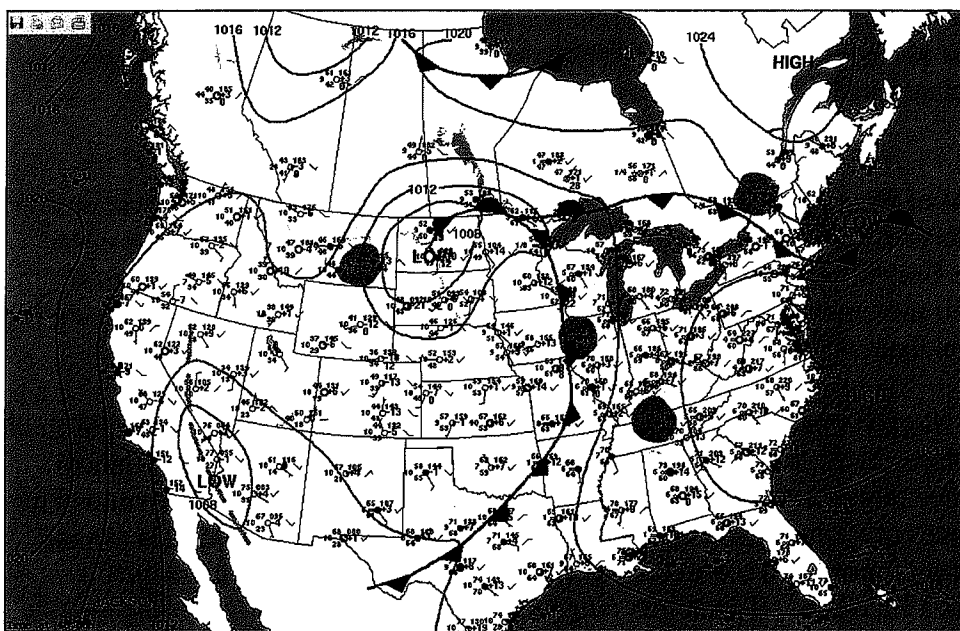


Figure 9: NOAA Daily Weather Map; May 31, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance “But For” the Event: None of the observations on May 31 exceeded the 24-hour NAAQS, nor did any of them contribute to a violation of the 24-hr NAAQS, so the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$). Chemical speciation data was collected on May 30. The approximate organic carbon increment ranges from 6.6 to $8.6 \mu\text{g}/\text{m}^3$, except for the Dubois site, which is approximated at $13.5 \mu\text{g}/\text{m}^3$. Given the range of the approximated increment and spatial distribution of speciation monitors, none of the flagged observations meet the “but for” criteria relative to the annual NAAQS. Therefore, Region 5 does not concur on any of the exceptional event flags for May 31st.

Event Date: June 1, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-019-1004	Walnut Street	Clark	32.3	No

Causal Connection: IDEM established a causal connection between the event and air quality for all of the flagged observations on June 1 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

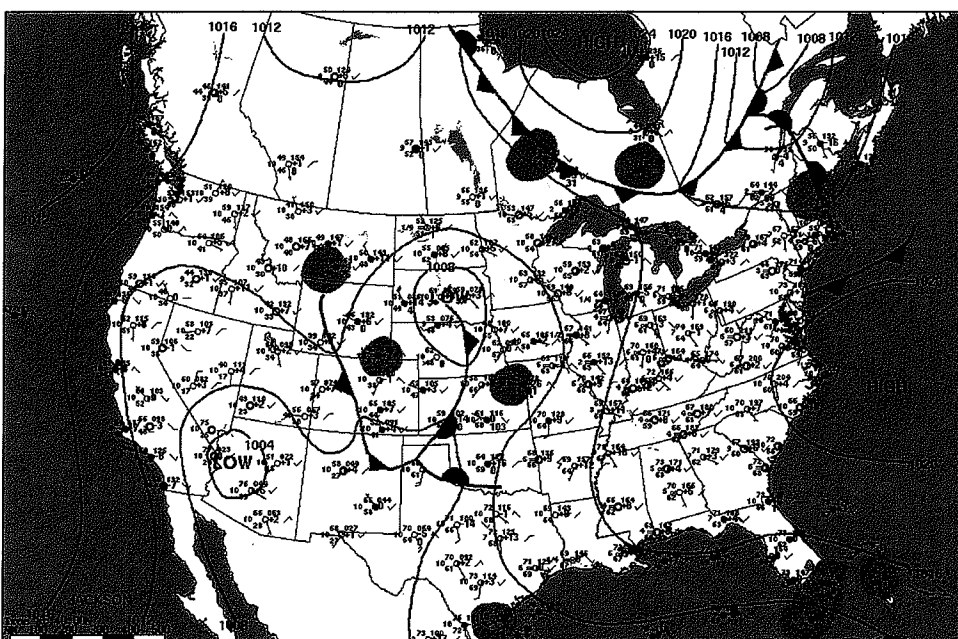


Figure 10: NOAA Daily Weather Map; June 1, 2007

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations.

Demonstration of Exceedance "But For" the Event: Concentrations significantly dropped throughout the State of Indiana on June 1, except for the Louisville area (Clark and Floyd Counties) (see Smoke Map, Figure 11). This is primarily due to changing weather patterns that pushed the smoke plume to the east. Speciation data collected at Washington Park in Indianapolis on June 2 is therefore not suitable to be used to approximate organic mass increment. Because the flagged observation on June 1 does not exceed the 24-hr NAAQS and does not contribute to a violation of the 24-hr NAAQS, the annual NAAQS becomes relevant. Accordingly, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$). There is

insufficient evidence to determine that there would have been no exceedance or violation but for the event. Therefore, Region 5 does not concur on this exceptional event request.

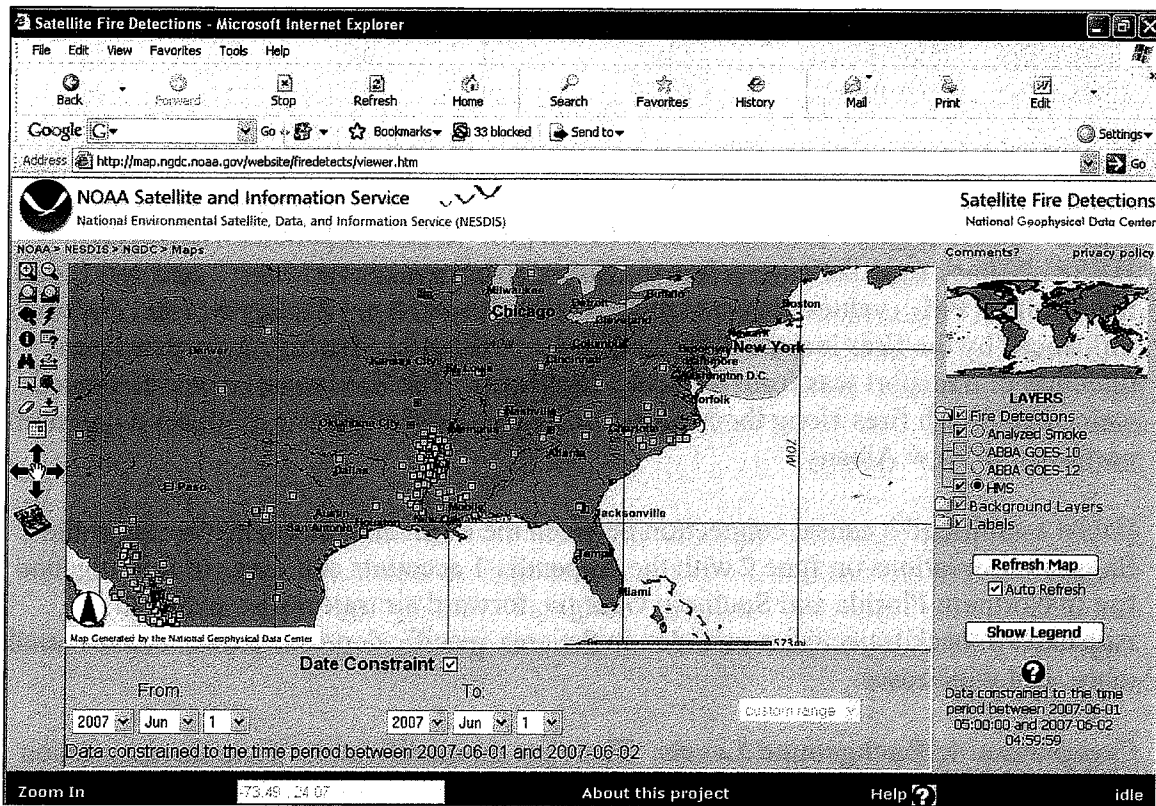


Figure 11: NOAA Satellite and Information Service's Satellite Fire Detection Map; June 1, 2007

Event Date: June 2, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-019-1004	Walnut Street	Clark	40.2	No
18-043-1004	New Albany	Floyd	35.1	No

Causal Connection: Region 5 requested additional information from IDEM regarding the June 2 event. The request for information was based on a reference to a local fire on June 2nd of the original demonstration from IDEM. IDEM responded with several HYSPLIT back trajectories to refine the direction of transport on June 2 and concluded that the high PM_{2.5} values collected in Jeffersonville and New Albany on June 2 were not influenced by the fires located to the northwest of the sites. Rather, the predominant direction of transport was from the south-southwest. The fires which were referenced were small brush fires along the Muscatatuck River, approximately 35 miles to the north-northwest of New Albany.

IDEM established a causal connection between the event and air quality for all of the flagged observations on June 2 with the Appendix 1 accounts and maps of the Bugaboo fire in Northern Florida and Southern Georgia, forward air trajectories included in Appendix 2, back trajectories included in the area specific demonstrations, NOAA smoke maps, and wind roses.

Comparison to Background Levels: There are no modifications from the description contained in the Methodology Section, which concluded that all of IDEM's flagged observations related to the Bugaboo fire are in excess of the normal historical fluctuations

Demonstration of Exceedance "But For" the Event: Both of the flagged values on June 2 exceed the 24-hr NAAQS, and therefore the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($35 \mu\text{g}/\text{m}^3$). The evidence to support the "but for" criteria provide mixed results, unlike the evidence had generally provided during several of the prior days in this event period. The sulfate pattern (Figure 14) mirrors the PM_{2.5} concentration pattern, which indicates that the observed levels are due to anthropogenic (controllable) emissions. Due to the relatively stable surface conditions, widespread elevated PM_{2.5} concentrations are observed. However, there is an isolated area of smoke in Southern Indiana indicated in the NAAPS smoke map (Figure 15). The NOAA Satellite Fire Detection Map shows that smoke is being concentrated on the Gulf Coast do weather patterns created by the approach of Hurricane Barry in Florida. Speciation data was collected in the Indianapolis, but since there is a clear demarcation between the observed concentrations in central Indiana from the two flagged observations in southeast Indiana, it is not appropriate to use Indianapolis' speciation data to calculate the approximate organic increment for these two observations collected in southeast Indiana. Due to the conflicting evidence and lack of additional data to approximate the impact of the Bugaboo fire on these sites, the requirement to establish that there would have been no exceedance or violation but for the event has not been met. Therefore, Region 5 does not concur on these two flagged events.

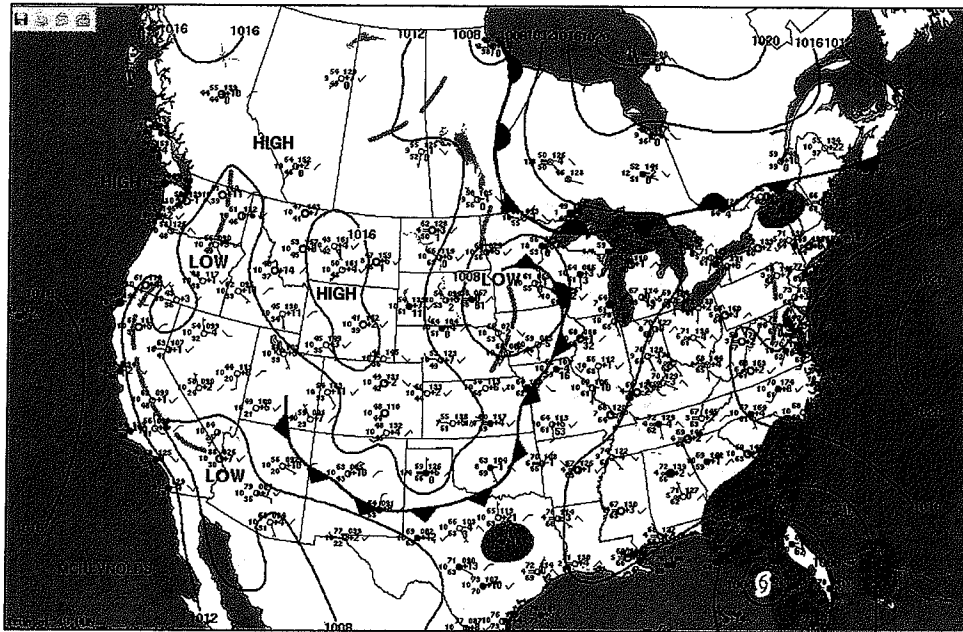


Figure 12: NOAA Daily Weather Map, June 2, 2007

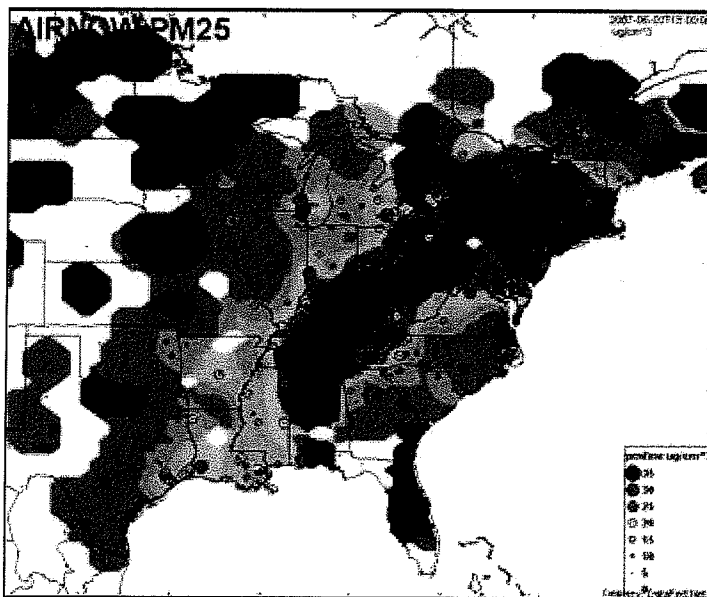


Figure 13: AIRNOW PM2.5

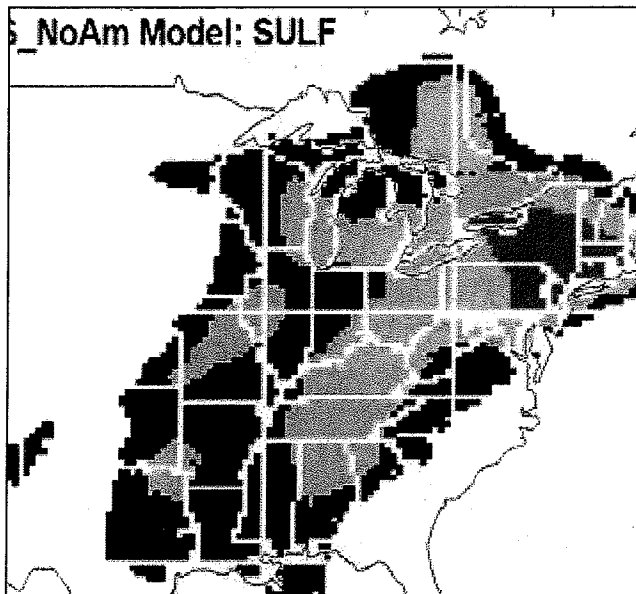


Figure 14: Modeled Sulfate, June 2, 2007; Naval Research Laboratory NAAPS global dust model

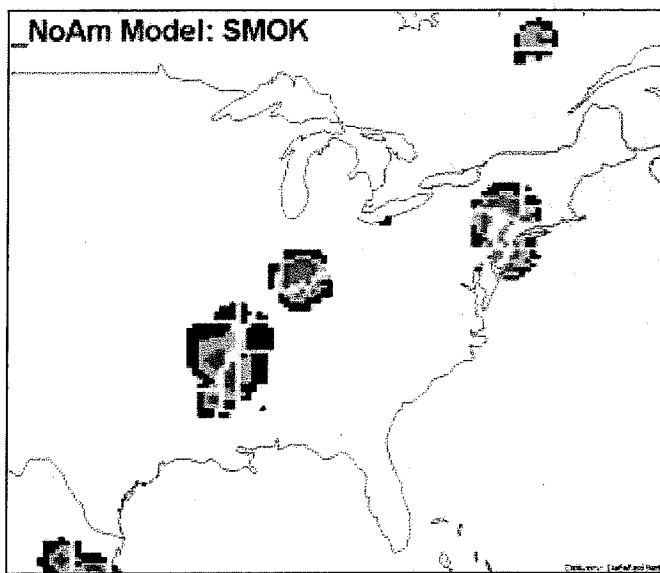


Figure 15: Modeled Smoke, June 2, 2007; Naval Research Laboratory NAAPS global dust model

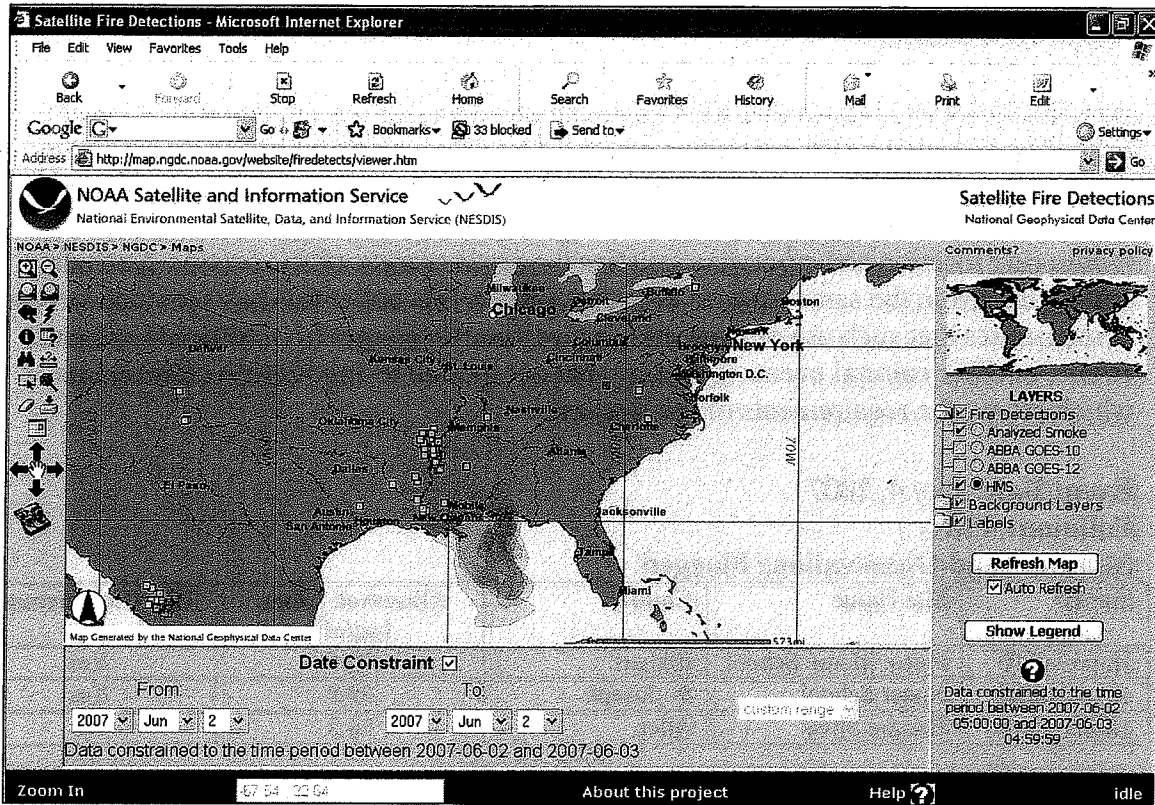


Figure 16: NOAA Satellite and Information Service's Satellite Fire Detection Map; June 2, 2007

July 4 Fireworks

40 CFR 50.14(b)(2) states that EPA shall exclude data from use in determinations of exceedances and NAAQS violations where a State demonstrates to EPA's satisfaction that emissions from fireworks displays caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the requirements of this section. Such data will be treated in the same manner as exceptional events under this rule, provided a State demonstrates that such use of fireworks is significantly integral to traditional national, ethnic, or other cultural events including, but not limited to July Fourth celebrations which satisfy the requirements of this section.

Event Date: July 4, 2007

Pollutant: PM_{2.5}

Monitors and Observations Flagged:

Site ID	Site Name	County	Observed Conc. ($\mu\text{g}/\text{m}^3$)	EPA Concurrence
18-039-0003	Pierre Moran School	Elkhart	70.6	Yes
18-141-0014	Nuner School	St. Joseph	39.0	Yes
18-003-0004	Beacon Street	Allen	34.3	No

Event Description: IDEM's demonstration states, "Most communities have a tradition of celebrating the Fourth of July with several activities throughout the day ending with huge fireworks displays in the evening. Unfortunately, this traditional celebration may have a short term impact on air quality especially if meteorological conditions are such that dispersion of the smoke plumes from these events is hindered. The short term effects typically last 2 - 6 hours and depending on the meteorological conditions and duration, can substantially impact the particulate loading of PM_{2.5} samples. In the State of Indiana, three sites in different communities experienced significantly high PM_{2.5} 24-hour concentrations on this date." IDEM did not provide specific descriptions of the location or quantity of the fireworks displays for these three exceptional event claims.

Comparison to Background Levels: Each of the observed and flagged July 4th concentrations is in excess of the upper 84th percentile of the multi-year measurements for the same site in the prior two years during the month of July. Therefore, they meet the criteria of being in excess of normal historical values.

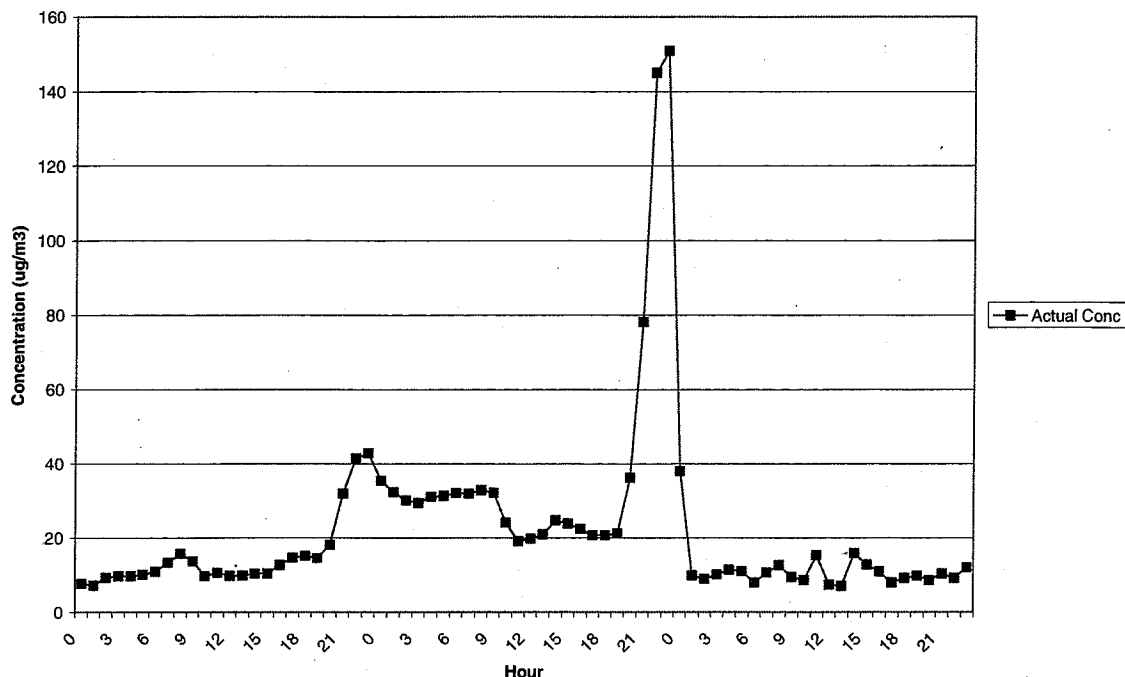
Demonstration of Exceedance "But For" the Event: The Pierre Moran School monitoring site is approximately 2 miles southwest of Central High School, which is where Elkhart County's annual firework display occurs. IDEM's exceptional event demonstration states that the winds were relatively calm across Northern Indiana at the time of the fireworks displays. A wind rose from a monitoring site in South Bend confirms the calm conditions. Unfortunately there is not continuous PM_{2.5} monitor located at this site to break down hourly components of the 24-hr average. This monitoring site does operate a PM_{2.5} speciation monitor; however, it operates every 6th day and did not operate on July 4th. Because this extremely high exceedance occurred on July 4, the monitor was very close to the county's firework display, and was an isolated

high observation consistent with a local emission source, Region 5 concurs on this observation.

Fireworks displays occurred at the Indiana University-Purdue University Fort Wayne campus, which is less than two miles Northwest of the Beacon Street monitoring site. The 24-hr average flagged observation ($34.3 \mu\text{g}/\text{m}^3$) did not exceed the 24-hr NAAQS, and it does not contribute to a violation because this site has a 2005 to 2007 design value of $33 \mu\text{g}/\text{m}^3$. Therefore, the exceptional event has to be determined to cause exceedances or violations of that NAAQS ($15 \mu\text{g}/\text{m}^3$).

The Beacon Street monitoring site in Ft. Wayne also hosts a continuous $\text{PM}_{2.5}$ monitor that provides hourly observations. The hourly $\text{PM}_{2.5}$ observations from July 3 to July 5 are plotted below. It is clear that evening hours on July 4th had much higher $\text{PM}_{2.5}$ concentrations than hours before or after the period of fireworks. Using the hourly data, a 24-hr average concentration was calculated with and without the inclusion of the impacted hours on July 4th. Including all hourly observations, the 24-hr average of the continuous data is $39.5 \mu\text{g}/\text{m}^3$, which is a few micrograms higher than the flagged observation ($34.3 \mu\text{g}/\text{m}^3$) recorded by the federal reference $\text{PM}_{2.5}$ monitor. Excluding the 3 hours impacted by the fireworks and re-calculating the 24-hr average of remaining hourly observations (21 hours), the average is $26.9 \mu\text{g}/\text{m}^3$. The impact of the fireworks can then be estimated from the difference of the average calculated with and without the impacted hours included. The fireworks contributed approximately $12 \mu\text{g}/\text{m}^3$. Subtracting this estimate of impact from the flagged value suggests that but for the event, the observed concentration would have still been above the level of the annual standard. Therefore, the requirement to establish that there would have been no exceedance or violation but for the event has not been met and Region 5 does not concur on this flagged event.

Hourly PM_{2.5} Concentration at Ft. Wayne Beacon Hill July 3rd to July 5



On July 4th, 2007, Coveleski Stadium displayed fireworks after the baseball game. This stadium is located about 3.5 miles west of the Nuner School monitoring site. The Nuner School monitoring site does not have a continuous PM_{2.5} monitor, but a continuous monitor does operate at the Shields Drive site located approximately three miles to the North. Using the same approach as explained above, the 24-hr average value calculated from the hourly concentrations was 40.5 with all hours, and 19.9 when taking the average of the 21 hours collected on July 4 before the fireworks occurred. Region 5 concurs on this event because the fireworks contributed approximately 20 $\mu\text{g}/\text{m}^3$ which provides sufficient evidence that there would have been no exceedance or violation but for the event.